

RANGE EXTENSIONS OF VASCULAR AQUATIC PLANTS IN NEW ENGLAND

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During 1970 and 1971 extensive collecting of vascular aquatic plants was conducted in New England. New records for some states as well as interesting extensions of range were noted. In New England the aquatic flora has been neglected during the past twenty years, so these ranges may have expanded or may have been overlooked. Such botanists as M. L. Fernald and A. S. Pease did extensive collecting in the time span of 1920 to 1955. Since then no single person has devoted much time to the aquatics in New England except William Countryman who has done extensive collecting in Vermont.

The plants collected and observed are discussed below. Representative specimens have been deposited in the author's personal herbarium as well as those of Boston State College, the University of New Hampshire and the New England Botanical Club.

Potamogeton filiformis Pers. var. **borealis** (Raf.) St. John

Both *Potamogeton filiformis* and its variety *borealis* are found in New England only in the extreme north. A plant of calcareous waters, (St. John, 1916), this plant has been collected from several areas in Aroostook County, Maine, and in northern Vermont (Seymour, 1969). A specimen in the University of New Hampshire herbarium (*S. B. Krochmal*, 142a) from Piermont, New Hampshire, Grafton County was examined by this author and keyed out as *P. filiformis* Pers. var. *Macounii* Morong, which has never been reported from New England. This identification is questionable and more specimens of this plant would be desirable for absolute identification. In October 1970, several specimens of the variety *borealis* were collected for the first time in New Hampshire in Lombard Pond, Colebrook, Coös County (*Hellquist* 93 and 94). This pond has

the highest alkalinity of any in the state with a Methyl Orange ppm. reading of 90 (Newell, 1960). Of all the ponds in New Hampshire this is one of the few where this *Potamogeton* would find the requirements of an alkaline body of water in the northern portion of the state. Lime Pond in Colebrook and Ladd Pond in West Stewartstown might also harbor this species.

Potamogeton crispus L.

This has increased its range extensively in the past fifty years. Records in the Gray Herbarium and the New England Botanical Club Herbarium include very few reports of the species. Seymour (1969) noted this plant from Middlesex County in Massachusetts, Chittenden County in Vermont, Providence County in Rhode Island and a number of areas in Connecticut. Collections of this plant were made from a number of ponds and lakes in Massachusetts and a couple from northwestern Connecticut. Ogden (1943) noted it from Spy Pond in Arlington, Massachusetts, Fresh Pond in Cambridge, Massachusetts and the Sudbury River in Concord, Massachusetts. All of these are in Middlesex County. In Connecticut, the Housatonic River in Litchfield County was the only area noted.

From the recent collections by the present author it is evident that *Potamogeton crispus* L. has increased its range extensively, especially in the hard water regions of Berkshire County, Massachusetts. This plant was extremely common in the Stockbridge Bowl, Stockbridge, Massachusetts where it was the most abundant pondweed and along with *Myriophyllum spicatum* L. var. *exalbescens* (Fernald) Jepson made up about 80% of the vascular vegetation. This plant was also extremely common at Lake Buel in Monterey and New Marlboro, Massachusetts, Mill Pond, South Egremont, Massachusetts and the Mill Pond in Sheffield, Massachusetts. A new record in Middlesex County for this species is Fisk Pond, Framingham, Massachusetts. From Connecticut it was found in Mudge Pond and Indian Lake, Sharon, Litchfield County. In all the above mentioned

areas except Stockbridge Bowl it was not the predominant species but was nevertheless common. This species has been known to be more tolerant of polluted waters (Fassett, 1966). After observing the water where collections were made this statement would seem to hold true. The ponds from western Massachusetts and Connecticut were in alkaline regions where this plant does well (Moyle, 1945). This plant should be looked for in almost all hard water regions of New England especially where pollution may occur.

Potamogeton strictifolius Ar. Benn. Var. **rutiloides** Fern.

This is one of the narrow-leaved pondweeds of the section Pusilli and is characteristic of basic or alkaline waters of the northern United States and Canada (Fernald, 1932). Fernald at that time noted it from Lake Champlain, Vermont. Seymour (1963) recorded the variety *rutiloides* from three other areas of western Vermont not far from Lake Champlain as well as from Berkshire County, Massachusetts.

A new eastern record for *Potamogeton strictifolius* Ar. Benn. Var. *rutiloides* Fern. in New England is the Mill Pond in Windsor, Vermont, Windsor County. It was abundant in some of the shallow areas on the eastern side of the pond. This plant, upon first observation, was mistaken by the writer for *Potamogeton Friesii* Rupr. with which it may be confused easily. *Potamogeton strictifolius* and its variety generally have three veins, but this specimen had three to five. Fernald (1932) noted that *P. strictifolius* may rarely have five veins. The Mill Pond has the typical vegetation of the more alkaline lakes including *Najas flexilis* (Willd.) Rostk. & Schmidt., *Vallisneria americana* Michx. and *Potamogeton pectinatus* L. (Moyle, 1945).

Potamogeton longiligulatus Fern.

One of the rarer pondweeds in the United States as well as New England is *P. longiligulatus*. Only two specimens have been reported and both were from northwestern Connecticut. Fernald (1932) noted it from Twin Lakes, Salis-

bury, Connecticut, where it was collected by C. H. Bissell in 1906. A second report was from Indian Lake in Sharon, Connecticut, (Seymour, 1969). This specimen was deposited in the New England Botanical Club Herbarium but after careful study by the writer it was found to be a very narrow-leaved form of *Potamogeton zosteriformis* Fernald.

The second actual record for this specimen comes from Evarts' Pond (Lake Runnymede) in Windsor, Vermont, Windsor County. Evarts' Pond is a privately owned pond which is of interest in that it was one of the ponds where *Potamogeton Hillii* Morong. had been reported in 1875 (Fernald, 1932). More recent collections of *P. Hillii* from Evarts' Pond in the late thirties are in the New England Botanical Club Herbarium. In an attempt to find *Potamogeton Hillii*, permission was received from the owners to collect in the pond.

A narrow-leaved pondweed believed to be *Potamogeton Hillii* was collected by the author at the northern portion of the northeast bay and on the southwestern end of the pond. In both areas it was found in water approximately three feet deep. Upon examining these collections carefully, it was determined that the two rare *Potamogetons*, *Hillii* and *longiligulatus* were both found. Fernald (1932) commented on much confusion in identifying these two species. Both have sharply acute, cuspidate leaves. *Potamogeton Hillii* has three veins while *P. longiligulatus* has five to nine. Both specimens were in flower at this time so they had the same initial appearance.

In talking with Mr. Evarts, one of the owners, it was learned that the state of the pond had deteriorated over the past two summers. The water previously had been very clear, but now becomes cloudy as the water warms up in the summer. He stated that corn has been planted along the north side of the pond, and is fertilized extensively with chemicals. This most likely has led to the turbid water with its poor light penetration so it was recommended that the corn crop be discontinued in 1972. Hopefully this would clear up the problem. Since this pond has no inlets, but

is spring-fed, it shouldn't take long for the water to become clear again. It would be a shame for the ecology of this pond to be so disturbed that these two valuable pondweeds would be destroyed. *Nymphaea tuberosa* Paine was also discovered here and will be discussed later in this paper.

Potamogeton gemmiparus Robbins.

This uncommon narrow-leaved pondweed has been reported from only four New England states: Maine, Massachusetts, Connecticut and Rhode Island (Fernald, 1932). Since it is from eastern New England it is found in more acid waters. This plant had never been reported in New Hampshire, where it should occur. Seymour (1969) records it as near as Fryeburg, Maine, where it is found in the Saco River.

Two stations of this plant were found by the author in Carroll County, New Hampshire, both in the Saco River drainage. One station where it was somewhat rare was the southern end of Conway Lake in Eaton, New Hampshire. Here it was found with other acid water plants such as *Potamogeton Berchtoldii* Fieber, *P. Berchtoldii* Fieber, var. *tenuissimus* (Mert. & Koch) Fern., *P. epihydrus* Raf. var. *ramosus* (Peck) House, *P. gramineus* L. var. *gramineus* and *P. capillaceus*. Bearcamp Pond in Sandwich, New Hampshire was the other site of collection. Here the specimen was collected at the inlet of the Bearcamp River. Again, it was not plentiful. *Potamogeton gemmiparus* was growing along with *P. natans* L., *P. gramineus* L. var. *myriophyllus* Robbins., *P. gramineus* L. var. *gramineus*, *P. confervoides*, Reichenb., *P. capillaceus* Poir. and *P. Spirillus* Tuckerm.

Egeria densa Planchon

Egeria has been reported from three different towns in New England — two in Massachusetts and one in Vermont (Seymour, 1969). The reports from Massachusetts were from Abington in Plymouth County and Quincy in Norfolk County. In Vermont it was collected from Townshend, Windham County. It was observed by the writer to be very

common in Hemenway Pond, Milton, Massachusetts, Norfolk County, near the Boston city limits where it was growing with *Elodea Nuttallii* (Planch.) St. John, *Potamogeton epihydrus* Raf. var. *ramosus* (Peck) House, *Myriophyllum humile* (Raf.) Morong and *Utricularia geminiscapa* Benj. This plant was introduced and naturalized from South America and is one to be looked for around cities because it is being sold in pet shops.

***Wolffia columbiana* Karst.**

This plant is continuing to spread its range to the north in New Hampshire. Previously reported from Hillsborough County, (Countryman, 1968) and Rockingham County (Colt, *et. al.*, 1971) it was discovered by the author in Durham, New Hampshire, Strafford County. In Durham, it was reported from two new locations — the Mill Pond and Beard's Creek Pond. This plant was not observed in either place in 1970, but was very abundant at Beard's Creek Pond and common at the Mill Pond in 1971. *Wolffia punctata* Griseb., which usually occurs with the former, was not found but should be looked for in the future.

In talking with Dr. Albion Hodgdon at the University of New Hampshire in Durham, it was agreed that this plant probably is rapidly extending its range. One explanation for the rapid spread may be the passage of ducks in the region moving between ponds. *Wolffia* would stick to their bodies and be carried around easily. Also anyone transferring a boat from ponds could easily introduce the plants into new bodies of water.

***Nymphaea tuberosa* Paine**

Seymour (1969) recorded this plant from six stations in western Vermont, Winchester, Massachusetts, and three townships in Connecticut. This species has been found by the writer to be quite abundant. In Vermont, a new eastern record for the state is herein reported from Evarts' Pond, Windsor County. Here it was the only member of the Nymphaeaceae and was found extensively around the pond. The first two records for this plant in New Hampshire are

Lake Kanasatka, Moultonboro, Carroll County and Beard's Creek Pond, Durham, Strafford County. This pond lily was found at the southern end of Lake Kanasatka near the gift shop "The Horse of Another Color" along Route 25. It appears that this plant was introduced here some time ago, due to its localized range at the southern end of the lake. It was found with other members of the same family including *Nymphaea odorata* Ait., *Nuphar variegatum* Engelm., and *Brasenia Schreberi* Gmel. This is a lake with a higher alkalinity than most other lakes in Carroll County as shown by the presence of *Potamogeton zosteriformis* Fernald and *P. praelongus* Wulfen. At Beard's Creek in Durham *Nymphaea tuberosa* Paine was found near Route 4 where it has spread throughout the southern end of the pond. The water is probably in much the same condition as Taylor River in Hampton, New Hampshire (Colt, *et al.*, 1971) since this also is a tidal estuary which has been blocked off by a dam. Much salt in the bottom might tend to raise the alkalinity of the water. Other plants of interest growing along with *N. tuberosa* here are *Myriophyllum verticillatum* L. var. *pectinatum* Wallr. and *Elodea Nuttallii* (Planch.).

In Massachusetts this plant was discovered by the writer in three locations, all within Middlesex County. These were the Sudbury and Concord Rivers in Concord, Massachusetts and a small pond by Upper Mystic Lake in Winchester, Massachusetts which is near the previously reported site. Mr. Richard Eaton of Lincoln, Massachusetts told the author in 1971 that *Nymphaea odorata* used to be very common in these rivers and was almost completely destroyed due to the pollution. *Nymphaea tuberosa* is found in the highly productive lakes of the midwest and seems to be more tolerant of polluted waters. In the Sudbury River *Nymphaea odorata* was found in limited numbers while *N. tuberosa* was more common. The area observed in the Concord River had *Nymphaea tuberosa* as the only water lily and it was found at only one location.

The location at Winchester, Massachusetts was a small

pond at the recreation area on the east side of Upper Mystic Lake. It appears that this lily was planted here as it does not extend into Upper Mystic Lake which connects with this pond.

This plant may be more common than previously observed. Many of the specimens reported as *Nymphaea odorata* Ait. var. *gigantea* Tricker may actually be *N. tuberosa*. The leaves of *N. tuberosa* are generally larger and green underneath, or with only a slight purplish tinge. Probably the best identifying characteristic of this plant is the large green petiole with brown stripes as opposed to the purple petiole of *Nymphaea odorata*. Fernald (1950) noted that the flowers are odorless or barely fragrant which may be misleading. The flowers have a noticeable odor, but when compared with *N. odorata* they are less fragrant. Another interesting feature found on a number of specimens was the presence of pubescence on the petiole near the blade. In some this was so marked that the striping in the petiole was obscured. Other characteristics which aid in identification are the more rounded petals and the tendency of the leaves to become elevated above the water by as much as one foot.

***Nymphaea alba* L. forma *rosea* Hartm.**

A European species, this pond lily has not been reported previously from New England. It was found by the writer to be relatively abundant in Winkley Pond, Barrington, New Hampshire, Strafford County. It occurs around the perimeter of the Pond where it grows with *Nymphaea odorata* and a possible hybrid between *N. odorata* and *N. alba* f. *rosea* which has the pointed more numerous petals and is a light pink. Winkley Pond is an acid body of water in a semi-bog condition with many ericaceous plants. Of particular interest as an associated plant is *Potamogeton confervoides* Reichenb. which is extremely common there.

Nymphaea alba f. *rosea* is characterized by 12-24 rounded deep pink petals (Fernald, 1950). The leaves are similar to *N. odorata* with deep purple undersides. The following

observations were made on *N. alba* f. *rosea*: many of the petioles were pubescent as seen in *N. tuberosa* and the leaves were elevated above the surface of the water along the edge of the pond. Because of the attractive blossom, this water lily may have been planted more extensively than observed. Many specimens labeled *Nymphaea odorata* Ait. forma *rubra* Guillon may actually be *N. alba* f. *rosea*.

Myriophyllum alterniflorum D. C.

Except for the present report *M. alterniflorum* has been found in New England only from numerous areas in Vermont and Maine and from Cöos County in northern New Hampshire (Seymour, 1969). Last year the first record of the species south of Cöos County in New Hampshire was noted in Upper Danforth Pond, town of Freedom, Carroll County, (Hellquist, 1971). Two other locations for this plant have also been found in Carroll County by the writer. One is from Cooks Pond in Madison, New Hampshire where it was scarce. Isolated plants were found in this acid-water pond which also included *Potamogeton confervoides* Reichenb. (Hodgdon, *et. al.*, 1946). Lake Kanasatka, Moultonboro, New Hampshire was the other station. The *Myriophyllum* was found at the south end of the lake near the previously reported *Nymphaea tuberosa* Paine. As more extensive studies are carried out in central New Hampshire, this plant should prove to be more abundant.

Myriophyllum heterophyllum Michx.

This plant has been quite uncommon in New England until recently if the few herbarium specimens are a fair indication. It had been recorded from Bridgeport, Connecticut, Uxbridge and Sutton, Massachusetts (Seymour, 1969). A specimen from Sandy Pond, Ayer, Massachusetts, collected by Edward Richardson in 1940 is on deposit in the University of Massachusetts herbarium.

In southern Worcester and Middlesex Counties, Massachusetts, the writer found *M. heterophyllum* to be extremely common in a number of ponds and lakes, where it forms

large beds around the shore. It has been found in Whitehall Reservoir and North Pond in Hopkinton, Middlesex County; Pratt Pond, Upton; Silver Lake, Grafton; and Hopedale Pond, Hopedale, Worcester County. Houghton's Pond (Hoosiwhisick Pond), Canton, Norfolk County, Mill Pond, Wareham, and Agawam River, Wareham, Plymouth County are other areas where this plant was found to be abundant. Fassett (1966) noted this plant to range from Virginia to Florida, west to Ontario and Minnesota, so it appears that this specimen is spreading rapidly in southern New England. One cause of this recent and rapid spread may be the fact that the plant is sold extensively in pet shops for aquarium use. It may be discarded into ponds and streams as has *Egeria densa* Planchon.

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A SECOND OCCURRENCE FOR TRIPHORA TRIANTHOPHORA (SW.) RYDB. IN MAINE. Another station of the orchid, *Triphora trianthophora*, the second to be found in the last few years, was discovered on August 31, 1971 at Evans Notch, Batchelders Grant, Oxford County by C. Paul Wight and me. This location is about three miles in a direct line from the Stow station (*Rhodora* 71: 509, 1969). This new station consists of many individuals growing on a wooded hillside in depressions which are filled with thickly matted beech leaves. It is difficult to estimate how many of the orchids occur at this station, as they tend to grow singly, spreading out over a large area, unlike the Stow station, where the orchids were growing in large groupings. We were fortunate in finding many of the plants still in flower for the majority had already lost their blossoms. Other interesting plants were found among the *Triphoras*, namely, *Corallorhiza maculata*, *Conopholis americana*, *Epifagus virginiana*, and members of the *Botrychium* group.

Specimens have been deposited at the Herbaria of the University of Maine and the New England Botanical Club.

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